DRINKING WATER SURVEILLANCE PROGRAM

UNION WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

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EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

UNION WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Union water supply system uses a conventional treatment plant with solids contact upflow clarification. It treats water from Lake Erie. The process consists of coagulation, flocculation, clarification, filtration and disinfection. Activated carbon is added for taste and odour control. This plant has a rated capacity of 65.9 x 1000 m^3/day. The Union water supply system serves a population of approximately 39,700.

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No health related guidelines were exceeded.

The Union water supply system, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW TESTS	RAW POSITIVE	RAW %POSITIVE	TREATED TESTS	TREATED POSITIVE	TREATED %POSITIVE	SITE 1 TESTS	SITE 1 POSITIVE	SITE 1 %POSITIVE	SITE 2 TESTS	SITE 2 POSITIVE	SITE 2 %POSITIVE
BACTERIOLOGICAL	15	10	66	5	0	0	6	3	50	6	2	33
CHEMISTRY (FLD)	18	18	100	35	35	100	72	72	100	72	72	100
CHEMISTRY (LAB)	132	115	87	131	95	72	228	196	85	228	198	86
METALS	144	59	40	144	44	30	276	124	44	276	110	39
CHLOROAROMATICS	70	0	0	70	0	0	70	0	0	70	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.	.	.	.
PAH	99	0	0	82	0	0	17	0	0	17	0	0
PESTICIDES & PCB	184	0	0	184	0	0	106	0	0	106	0	0
PHENOLICS	6	0	0	6	1	16	.	.	.	.	.	.
SPECIFIC PESTICIDES	55	0	0	55	0	0	5	0	0	5	0	0
VOLATILES	145	0	0	145	20	13	145	20	13	145	20	13
TOTAL	880	202		869	195		925	415		925	402	

DRINKING WATER SURVEILLANCE PROGRAM

UNION WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Union treatment plant in February of 1987. Previous annual reports have been published for 1987, 1988 and 1989

PLANT DESCRIPTION

The Union water supply system is a conventional treatment plant with solids contact upflow clarification and treats water from Lake Erie. The process consists of coagulation, flocculation, clarification, filtration and disinfection. Powdered activated carbon is used for taste and odour control. This plant has a rated capacity of 65.9 x 1000 m^3/day. The Union water supply system serves a population of approximately 39,700. The H.J. Heinz company accounts for 32% of the yearly water consumption.

The sample day flows ranged from 29.4 x 1000 m^3/day to 58.9 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic

compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at two locations in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses was conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be

confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count is a test used to supplement routine analysis for coliform bacteria. The limit for standard plate count (at 35°C after 48 hours) in the ODWOs is 500 counts/mL (based on a geometric mean of 5 or more samples). DWSP bacteriological analysis of treated and distributed water was limited to standard plate count, which may indicate some deterioration in water quality if the guideline of 500 counts/mL is exceeded.

Standard plate count (membrane filtration) exceeded the ODWO Maximum Desirable Concentration of 500/counts/mL in 1 of 17 treated and distributed samples with a maximum reported value of 1.500 count/mL.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 9 of 18 treated and distributed water samples with a maximum reported value of 24.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 18 of 18 treated and distributed water samples with a maximum reported value of 133.8 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWO Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The lab turbidity exceeded the Maximum Acceptable Concentration in one treated water sample at 1.3 FTU but this was not confirmed by the corresponding field turbidity result which was considered more reliable.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatics scan showed that none were detected.

CHLOROPHENOLS

The results of the chlorophenols scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in the 15 treated and distributed water samples analyzed with a maximum level of 31.3 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Union water treatment plant, for the sample year of 1990, produced good quality water and this was maintained in the distribution system.

FIGURE 1

UNION WATER SUPPLY SYSTEM

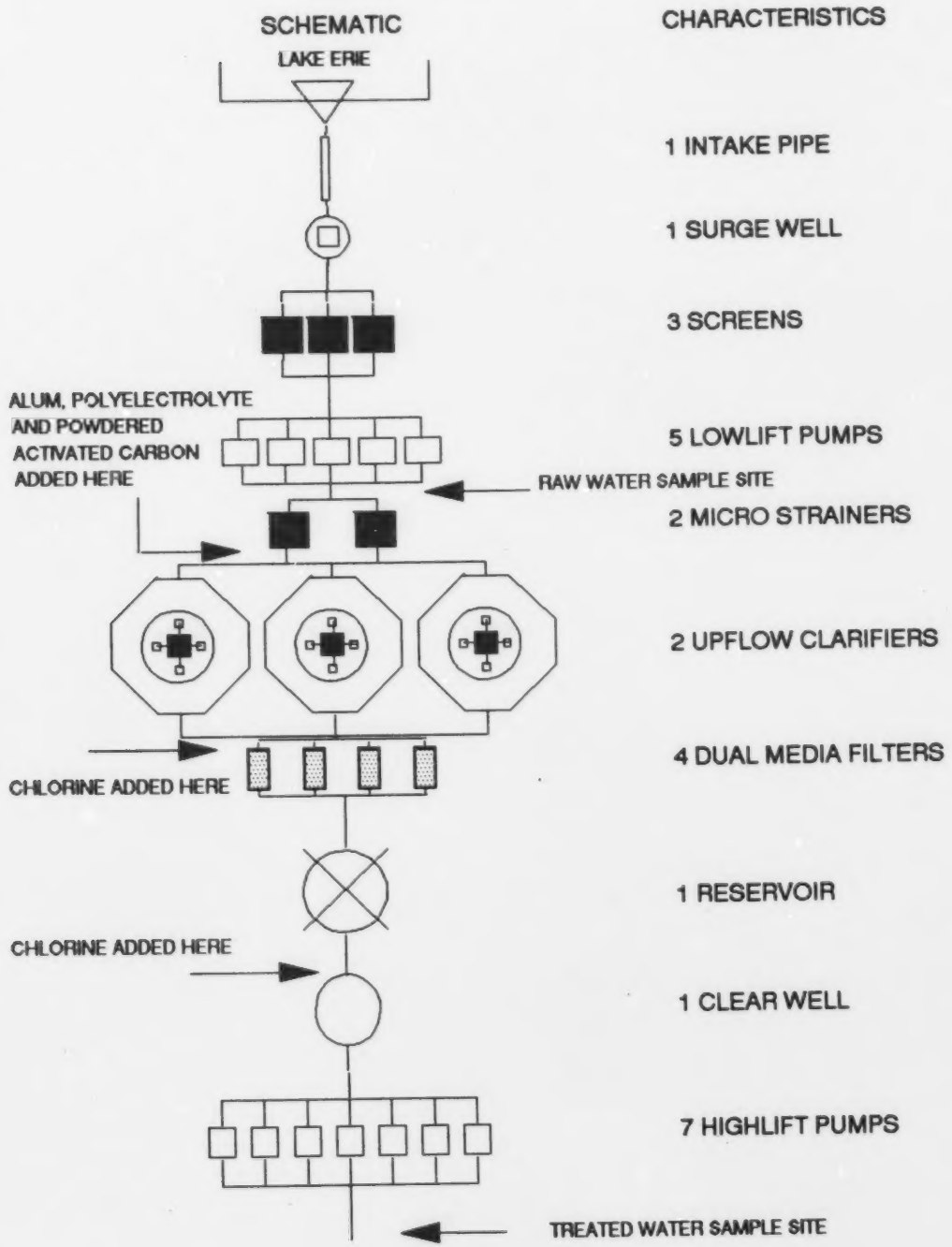

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 210000853
PLANT NAME: UNION WSS

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER :J. DRUMMOND

UTM #: 173614804654460

PLANT SUPERINTENDENT: ERNIE JOHNSTON
(ASSISTANT: DWAINE DAWSON)

ADDRESS: PO BOX 359 - 1509 UNION AVE
RUTHVEN, ONT
N0P 2G0
(519-326-4447)
FAX 519-326-0450

MUNICIPALITY: GOSFIELD SOUTH
AUTHORITY: PROVINCIAL

PLANT INFORMATION

PLANT VOLUME:	10.090	(X 1000 M3)
DESIGN CAPACITY:	68.190	(X 1000 M3/DAY)
RATED CAPACITY:	65.917	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
ESSEX	6,336
GOSFIELD NORTH	2,078
GOSFIELD SOUTH	7,052
KINGSVILLE	5,380
LEAMINGTON	12,680
MAIDSTONE TOWNSHIP	1,240
MERSEA TOWNSHIP	3,718
ROCHESTER TOWNSHIP	840
SANDWICH SOUTH TOWNSHIP	372

TABLE 2

DRINKING WATER SURVEILLANCE PROGRAM

IN-PLANT MONITORING

PARAMETER:	LOCATION:	FREQUENCY:
ALUMINUM	TREATED WATER	WEEKLY
FREE CHLORINE RESIDUAL	TREATED WATER	EVERY 8 HOURS
TOTAL CHLORINE RESIDUAL	AFTER FILTERS (PRE)	CONTINUOUS MANUALLY 8 HOURS
	TREATED WATER (POST)	CONTINUOUS MANUALLY 8 HOURS
PH	RAW WATER	1/DAY
	TREATED WATER	1/DAY
TEMPERATURE	RAW WATER	3/DAY
TURBIDITY	AFTER CLARIFIERS	2 HOURS
	AFTER FILTERS	CONTINUOUS MANUALLY 2 HOURS
	RAW WATER	2 HOURS
	TREATED WATER	CONTINUOUS MANUALLY 2 HOURS

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM UNION WSS SAMPLE DAY CONDITIONS FOR 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)				
			COAGULATION	COAGULATION AID	TASTE & ODOUR	PRE CHLORINATION	POST CHLORINATION
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	ALUM LIQUID	POLYELECTROLYTE	ACTIVATED CARBON POW	CHLORINE	CHLORINE
FEB 07	21.21	29.458	20.00	.15	1.00	.30	.75
APR 04	15.50	49.090	20.00	.15	1.00	.35	.75
JUN 06	14.50	52.636	25.00	.15	2.00	.30	.75
AUG 08	9.10	58.920	20.00	.15	2.00	.30	.75
OCT 02	9.40	56.825	20.00	.15	2.00	.30	.75
DEC 04	15.15	35.459	20.00	.15	1.00	.30	.75

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL												
FECAL COLIFORM MF	5	3	0	.	.	.	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	5	0	0	6	3	0	6	2	0
TOTAL COLIFORM MF	5	2	0	.	.	.	.	.	.	.	.	.
T COLIFORM BCKGRD MF	5	5	0	.	.	.	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	15	10	0	5	0	0	6	3	0	6	2	0
CHEMISTRY (FLD)												
FLD CHLORINE (COMB)	.	.	.	6	6	0	12	12	0	12	12	0
FLD CHLORINE FREE	.	.	.	5	5	0	12	12	0	12	12	0
FLD CHLORINE (TOTAL)	.	.	.	6	6	0	12	12	0	12	12	0
FLD PH	6	6	0	6	6	0	12	12	0	12	12	0
FLD TEMPERATURE	6	6	0	6	6	0	12	12	0	12	12	0
FLD TURBIDITY	6	6	0	6	6	0	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (FLD)	18	18	0	35	35	0	72	72	0	72	72	0
CHEMISTRY (LAB)												
ALKALINITY	6	6	0	6	6	0	12	12	0	12	12	0
CALCIUM	6	6	0	6	6	0	12	12	0	12	12	0
CYANIDE	6	0	0	6	0	0	.	.	.	.	.	.
CHLORIDE	6	6	0	6	6	0	12	12	0	12	12	0
COLOUR	6	0	5	6	0	3	12	0	8	12	0	8
CONDUCTIVITY	6	6	0	6	6	0	12	12	0	12	12	0
DISS ORG CARBON	6	6	0	6	6	0	12	12	0	12	12	0
FLUORIDE	6	6	0	6	5	1	12	9	3	12	10	2
HARDNESS	6	6	0	6	6	0	12	12	0	12	12	0
IONCAL	6	6	0	6	6	0	12	12	0	12	12	0
LANGELIERS INDEX	6	6	0	5	5	0	12	12	0	12	12	0
MAGNESIUM	6	6	0	6	6	0	12	12	0	12	12	0
SODIUM	6	6	0	6	6	0	12	12	0	12	12	0
AMMONIUM TOTAL	6	3	0	6	1	3	12	5	5	12	5	4
NITRITE	6	6	0	6	2	1	12	4	6	12	4	4
TOTAL NITRATES	6	6	0	6	6	0	12	12	0	12	12	0
NITROGEN TOT KJELD	6	6	0	6	5	1	12	10	2	12	11	1
PH	6	6	0	6	6	0	12	12	0	12	12	0
PHOSPHORUS FIL REACT	6	4	1	6	0	2	.	.	.	.	.	.
PHOSPHORUS TOTAL	6	6	0	6	0	3	.	.	.	.	.	.
SULPHATE	6	6	0	6	6	0	12	12	0	12	12	0
TURBIDITY	6	6	0	6	5	1	12	12	0	12	12	0
*TOTAL SCAN CHEMISTRY (LAB)	132	115	6	131	95	15	228	196	24	228	198	19

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS												
SILVER	6	0	0	6	0	0	12	0	0	12	0	0
ALUMINUM	6	6	0	6	6	0	12	12	0	12	12	0
ARSENIC	6	1	5	6	0	4	12	0	9	12	0	8
BARIUM	6	6	0	6	6	0	12	12	0	12	12	0
BORON	6	4	2	6	3	3	12	10	2	12	9	3
BERYLLIUM	6	0	1	6	0	1	12	0	1	12	0	2
CADMIUM	6	0	0	6	0	0	12	0	3	12	0	1
COBALT	6	0	6	6	0	3	12	0	8	12	0	9
CHROMIUM	6	0	4	6	0	3	12	0	8	12	0	6
COPPER	6	0	6	6	0	6	12	12	0	12	12	0
IRON	6	6	0	6	0	1	12	1	8	12	0	3
MERCURY	6	1	0	6	0	0	.	.	.	.	.	.
MANGANESE	6	6	0	6	5	1	12	12	0	12	5	7
MOLYBDENUM	6	4	2	6	6	0	12	12	0	12	12	0
NICKEL	6	0	5	6	0	3	12	5	7	12	2	5
LEAD	6	4	2	6	1	5	12	9	3	12	5	7
ANTIMONY	6	1	5	6	1	5	12	6	6	12	5	7
SELENIUM	6	0	1	6	0	3	12	0	6	12	0	5
STRONTIUM	6	6	0	6	6	0	12	12	0	12	12	0
TITANIUM	6	5	1	6	2	4	12	4	8	12	4	8
THALLIUM	6	0	0	6	0	0	12	0	0	12	0	0
URANIUM	6	0	6	6	0	4	12	0	9	12	0	11
VANADIUM	6	5	1	6	4	2	12	9	3	12	8	4
ZINC	6	4	2	6	4	2	12	8	4	12	12	0
*TOTAL SCAN METALS	144	59	49	144	44	50	276	124	85	276	110	86
*TOTAL GROUP INORGANIC & PHYSICAL	294	192	55	310	174	65	576	392	109	576	380	105
CHLOROAROMATICS												
HEXACHLOROBUTADIENE	5	0	0	5	0	0	5	0	0	5	0	0
123 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
1234 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
1235 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
124 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
1245 T-CHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
135 TRICHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
HCB	5	0	0	5	0	0	5	0	0	5	0	0
HEXACHLOROETHANE	5	0	0	5	0	0	5	0	0	5	0	0
OCTACHLOROSTYRENE	5	0	0	5	0	0	5	0	0	5	0	0
PENTACHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
236 TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	5	0	0
245 TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	5	0	0
26A TRICHLOROTOLUENE	5	0	0	5	0	0	5	0	0	5	0	0
*TOTAL SCAN CHLOROAROMATICS	70	0	0	70	0	0	70	0	0	70	0	0
CHLOROPHENOLS												

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0	0	0	0
PAH												
PHENANTHRENE	6	0	0	5	0	0	1	0	0	1	0	0
ANTHRACENE	5	0	0	4	0	0	1	0	0	1	0	0
FLUORANTHENE	6	0	0	5	0	0	1	0	0	1	0	0
PYRENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(A)ANTHRACENE	6	0	0	5	0	0	1	0	0	1	0	0
CHRYSENE	6	0	0	5	0	0	1	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	5	0	0	4	0	0	1	0	0	1	0	0
BENZO(E) PYRENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(B) FLUORANTHEN	6	0	0	5	0	0	1	0	0	1	0	0
PERYLENE	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(K) FLUORANTHEN	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(A) PYRENE	5	0	0	4	0	0	1	0	0	1	0	0
BENZO(G,H,I) PERYLEN	6	0	0	5	0	0	1	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	6	0	0	5	0	0	1	0	0	1	0	0
INDENO(1,2,3-C,D) PY	6	0	0	5	0	0	1	0	0	1	0	0
BENZO(B) CHRYSENE	6	0	0	5	0	0	1	0	0	1	0	0
CORONENE	6	0	0	5	0	0	1	0	0	1	0	0
*TOTAL SCAN PAH	99	0	0	82	0	0	17	0	0	17	0	0
PESTICIDES & PCB												
ALDRIN	5	0	0	5	0	0	5	0	0	5	0	0
ALPHA BHC	5	0	1	5	0	1	5	0	0	5	0	0
BETA BHC	5	0	0	5	0	0	5	0	0	5	0	0
LINDANE	5	0	0	5	0	0	5	0	0	5	0	0
ALPHA CHLORDANE	5	0	0	5	0	0	5	0	0	5	0	0
GAMMA CHLORDANE	5	0	0	5	0	0	5	0	0	5	0	0
DIELDRIN	5	0	0	5	0	0	5	0	0	5	0	0
METHOXYCHLOR	5	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN 1	5	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN II	5	0	0	5	0	0	5	0	0	5	0	0
ENDRIN	5	0	0	5	0	0	5	0	0	5	0	0
ENDOSULFAN SULPHATE	5	0	0	5	0	0	5	0	0	5	0	0
HEPTACHLOR EPOXIDE	5	0	0	5	0	0	5	0	0	5	0	0
HEPTACHLOR	5	0	0	5	0	0	5	0	0	5	0	0
MIREX	5	0	0	5	0	0	5	0	0	5	0	0
OXYCHLORDANE	5	0	0	5	0	0	5	0	0	5	0	0
OPDDT	5	0	0	5	0	0	5	0	0	5	0	0
PCB	5	0	0	5	0	0	5	0	0	5	0	0
DDD	5	0	0	5	0	0	5	0	0	5	0	0
PPDDE	5	0	0	5	0	0	5	0	0	5	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	5	0	0	5	0	0	5	0	0	5	0	0
AMETRINE	6	0	0	6	0	0	.	.	.	.	.	.
ATRAZINE	6	0	2	6	0	1	.	.	.	.	.	.
ATRATONE	6	0	0	6	0	0	.	.	.	.	.	.
CYANAZINE (BLADEX)	6	0	0	6	0	0	.	.	.	.	.	.
DESETHYLATRAZINE	6	0	0	6	0	0	.	.	.	.	.	.
D-ETHYL SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETONE	6	0	0	6	0	0	.	.	.	.	.	.
PROPAZINE	6	0	0	6	0	0	.	.	.	.	.	.
PROMETRYNE	6	0	0	6	0	0	.	.	.	.	.	.
METRIBUZIN (SENCOR)	6	0	0	6	0	0	.	.	.	.	.	.
SIMAZINE	6	0	0	6	0	0	.	.	.	.	.	.
ALACHLOR (LASSO)	6	0	0	6	0	0	.	.	.	.	.	.
METOLACHLOR	6	0	0	6	0	0	.	.	.	.	.	.
HEXACLCYCLOPENTADIEN	1	0	0	1	0	0	1	0	0	1	0	0
*TOTAL SCAN PESTICIDES & PCB	184	0	3	184	0	2	106	0	0	106	0	0
PHENOLICS												
PHENOLICS	6	0	1	6	1	1	.	.	.	.	.	.
*TOTAL SCAN PHENOLICS	6	0	1	6	1	1	0	0	0	0	0	0
SPECIFIC PESTICIDES												
TOXAPHENE	5	0	0	5	0	0	5	0	0	5	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.	.	.	.
DIAZINON	2	0	0	2	0	0	.	.	.	.	.	.
DICHLOROVOS	2	0	0	2	0	0	.	.	.	.	.	.
CHLORPYRIFOS	2	0	0	2	0	0	.	.	.	.	.	.
ETHION	2	0	0	2	0	0	.	.	.	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.	.	.	.
MALATHION	2	0	0	2	0	0	.	.	.	.	.	.
MEVINPHOS	2	0	0	2	0	0	.	.	.	.	.	.
METHYL PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
METHYLTRITHION	2	0	0	2	0	0	.	.	.	.	.	.
PARATHION	2	0	0	2	0	0	.	.	.	.	.	.
PHORATE	1	0	0	1	0	0	.	.	.	.	.	.
RELDAN	2	0	0	2	0	0	.	.	.	.	.	.
RONNEL	2	0	0	2	0	0	.	.	.	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.	.	.	.
BENONYL	0	0	0	0	0	0	.	.	.	.	.	.
BUX	0	0	0	0	0	0	.	.	.	.	.	.
CARBOFURAN	2	0	0	2	0	0	.	.	.	.	.	.
CICP	2	0	0	2	0	0	.	.	.	.	.	.
DIALLATE	2	0	0	2	0	0	.	.	.	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1			SITE 2		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAN	2	0	0	2	0	0	.	.	.	.	.	.
IPC	2	0	0	2	0	0	.	.	.	.	.	.
PROPOXUR	2	0	0	2	0	0	.	.	.	.	.	.
CARBARYL	2	0	0	2	0	0	.	.	.	.	.	.
BUTYLATE	2	0	0	2	0	0	.	.	.	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	55	0	0	55	0	0	5	0	0	5	0	0
VOLATILES												
BENZENE	5	0	0	5	0	2	5	0	1	5	0	1
TOLUENE	5	0	0	5	0	0	5	0	1	5	0	0
ETHYLBENZENE	5	0	0	5	0	2	5	0	2	5	0	2
P-XYLENE	5	0	0	5	0	0	5	0	0	5	0	0
M-XYLENE	5	0	0	5	0	0	5	0	0	5	0	0
O-XYLENE	5	0	0	5	0	0	5	0	0	5	0	0
STYRENE	5	0	0	5	0	0	5	0	2	5	0	0
1,1 DICHLOROETHYLENE	5	0	0	5	0	0	5	0	0	5	0	0
METHYLENE CHLORIDE	5	0	0	5	0	0	5	0	0	5	0	0
T1,2DICHLOROETHYLENE	5	0	0	5	0	0	5	0	0	5	0	0
1,1 DICHLOROETHANE	5	0	0	5	0	0	5	0	0	5	0	0
CHLOROFORM	5	0	1	5	5	0	5	5	0	5	5	0
111, TRICHLOROETHANE	5	0	2	5	0	1	5	0	0	5	0	0
1,2 DICHLOROETHANE	5	0	0	5	0	0	5	0	0	5	0	0
CARBON TETRACHLORIDE	5	0	0	5	0	0	5	0	0	5	0	0
1,2 DICHLOROPROPANE	5	0	0	5	0	0	5	0	0	5	0	0
TRICHLOROETHYLENE	5	0	0	5	0	0	5	0	0	5	0	0
DICHLOROBROMOMETHANE	5	0	0	5	5	0	5	5	0	5	5	0
112 TRICHLOROETHANE	5	0	0	5	0	0	5	0	0	5	0	0
CHLORODIBROMOMETHANE	5	0	0	5	5	0	5	5	0	5	5	0
T-CHLOROETHYLENE	5	0	0	5	0	1	5	0	1	5	0	1
BROMOFORM	5	0	0	5	0	5	5	0	5	5	0	5
1122 T-CHLOROETHANE	5	0	0	5	0	0	5	0	0	5	0	0
CHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
1,4 DICHLOROBENZENE	5	0	0	5	0	0	5	0	1	5	0	0
1,3 DICHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
1,2 DICHLOROBENZENE	5	0	0	5	0	0	5	0	0	5	0	0
ETHLYENE DIBROMIDE	5	0	0	5	0	0	5	0	0	5	0	0
TOTL TRIHALOMETHANES	5	0	0	5	5	0	5	5	0	5	5	0
*TOTAL SCAN VOLATILES	145	0	3	145	20	11	145	20	13	145	20	9
*TOTAL GROUP ORGANIC	571	0	7	554	21	14	343	20	13	343	20	9

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SM	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR		Unreliable: Could Not Confirm By Reanalysis
UCS		Unreliable: Contamination Suspected
UIN		Unreliable: Indeterminate Interference
XP		Positive After X Number Of Hours
T#	(T06)	Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
BACTERIOLOGICAL						
FECAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 0 (A1)		
FEB	BDL	.	.	.	.	.
APR	0	.	.	.	.	.
AUG	1	.	.	.	.	.
OCT	1	.	.	.	.	.
DEC	14	.	.	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		DET'N LIMIT = 0		GUIDELINE = 500/ML (A3)		
FEB	.	0 <=>	.	12	.	10
APR	.	1 <=>	.	1 <=>	.	2 <=>
JUN	.	.	.	1500	.	1 <=>
AUG	.	1 <=>	.	27	.	33
OCT	.	0 <=>	.	2 <=>	.	0 <=>
DEC	.	0 <=>	.	0 <=>	.	0 <=>
TOTAL COLIFORM MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = 5/100ML(A1)		
FEB	BDL	.	.	.	.	.
APR	40 <=>	.	.	.	.	.
AUG	BDL	.	.	.	.	.
OCT	1300	.	.	.	.	.
DEC	1600	.	.	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		DET'N LIMIT = 0		GUIDELINE = N/A		
FEB	420	.	.	.	.	.
APR	590	.	.	.	.	.
AUG	9500	.	.	.	.	.
OCT	26000	.	.	.	.	.
DEC	11000	.	.	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

		WATER TREATMENT PLANT			DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (FLD)						
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.800	.100	.200	.100	.100
APR	.	.300	.200	.300	.200	.200
JUN	.	.050	.100	.100	.100	.100
AUG	.	.100	.200	.200	.200	.100
OCT	.	.040	.100	.100	.100	.050
DEC	.	.100	.250	.100	.100	.100
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.	.300	.200	.400	.600
APR	.	.450	.100	.200	.100	.100
JUN	.	.750	.100	.100	.200	.300
AUG	.	.700	.300	.300	.100	.300
OCT	.	.770	.100	.200	.200	.400
DEC	.	.560	.100	.300	.300	.500
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A		
FEB	.	.800	.400	.400	.500	.700
APR	.	.750	.300	.500	.300	.300
JUN	.	.800	.200	.200	.300	.400
AUG	.	.800	.500	.500	.300	.400
OCT	.	.810	.200	.300	.300	.450
DEC	.	.660	.350	.400	.400	.600
FLD PH (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	7.300	7.300	7.500	7.400	7.500	7.200
APR	7.980	7.400	7.600	7.400	7.600	7.400
JUN	8.010	7.200	7.400	7.200	7.300	7.300
AUG	7.970	7.200	7.300	7.300	7.300	7.300
OCT	8.060	7.240	7.500	7.300	7.500	7.500
DEC	8.100	7.370	7.400	7.400	7.500	7.500
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)		
FEB	.500	1.500	18.000	9.000	18.000	13.500
APR	5.500	7.000	17.000	12.000	17.000	13.000
JUN	19.500	19.500	19.500	18.000	18.500	17.000
AUG	24.500	24.000	22.000	22.000	21.500	21.000
OCT	18.500	18.500	20.500	20.000	20.000	18.500
DEC	5.000	5.000	15.000	12.500	17.000	10.000
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)		
FEB	8.000	.070	.200	.120	.180	.130
APR	25.000	.040	.230	.140	.180	.110
JUN	43.000	.040	.190	.180	.190	.190
AUG	3.000	.060	.080	.080	.070	.070
OCT	5.800	.060	.350	.140	.260	.130
DEC	45.000	.060	.100	.100	.060	.060

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
CHEMISTRY (LAB)						
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)		
FEB	90.700	80.500	83.400	83.000	83.500	83.300
APR	93.900	81.700	85.100	84.900	85.200	85.100
JUN	88.800	73.900	77.300	77.600	78.000	78.200
AUG	87.500	76.800	79.600	78.900	80.000	80.600
OCT	87.200	73.900	75.600	76.100	77.200	76.400
DEC	88.400	77.900	85.600	85.100	81.800	83.300
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)		
FEB	34.000	34.000	34.600	34.800	34.600	34.800
APR	35.600	36.000	36.600	36.400	36.600	36.400
JUN	34.400	35.000	35.600	36.200	35.400	35.600
AUG	30.200	30.800	32.500	32.000	32.500	33.500
OCT	32.400	31.400	33.600	33.400	33.400	33.600
DEC	32.100	33.000	39.900	39.700	36.200	37.400
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)		
FEB	14.300	15.500	15.400	14.800	15.000	14.700
APR	19.100	19.900	20.100	20.000	19.800	19.800
JUN	15.400	16.400	17.000	16.600	16.700	16.700
AUG	12.000	13.000	13.500	13.300	14.200	13.600
OCT	10.500	11.500	12.600	12.900	12.500	12.000
DEC	11.800	13.100	25.400	25.100	20.100	21.400
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)		
FEB	.500 <T	BDL	.500 <T	.500 <T	.500 <T	BDL
APR	BDL	.500 <T	BDL	BDL	.500 <T	BDL
JUN	1.000 <T	BDL	BDL	BDL	BDL	BDL
AUG	1.500 <T	BDL	1.000 <T	.500 <T	.500 <T	.500 <T
OCT	2.000 <T	.500 <T	.500 <T	1.000 <T	.500 <T	.500 <T
DEC	.500 <T	.500 <T	1.000 <T	1.000 <T	.500 <T	.500 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)		
FEB	268	275	279	276	277	276
APR	296	302	305	304	302	304
JUN	265	280	287	285	283	284
AUG	248	255	260	258	260	261
OCT	241	247	254	256	254	252
DEC	247	257	324	323	293	304
DISS ORG CARBON (MG/L)			DET'N LIMIT = .100	GUIDELINE = 5.0 (A3)		
FEB	1.900	1.400	1.400	1.500	1.400	1.500
APR	2.000	1.400	1.500	1.400	1.400	1.400
JUN	2.000	1.500	2.200	1.400	1.300	1.300
AUG	1.900	1.500	1.300	1.200	1.300	1.200
OCT	1.700	1.200	1.200	1.200	1.200	1.100
DEC	1.500	1.100	1.300	1.200	1.200	1.100

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
FLUORIDE (MG/L)			DET'N LIMIT = 0.01	GUIDELINE = 2.4 (A1)		
FEB	.120	.080	.040 <T	.080	.080	.080
APR	.100	.080	.080	.080	.080	.080
JUN	.100	.060	.080	.080	.090	.080
AUG	.100	.080	.100	.100	.100	.100
OCT	.060	.040 <T	.040 <T	.040 <T	.040 <T	.040 <T
DEC	.080	.080	.080	.080	.080	.080
HARDNESS (MG/L)			DET'N LIMIT = 0.5	GUIDELINE = 80-100 (A4)		
FEB	120.000	120.000	121.000	122.000	121.000	121.000
APR	124.000	125.000	126.000	125.000	126.000	125.000
JUN	120.000	121.000	122.000	124.000	121.000	122.000
AUG	109.800	110.900	114.700	113.000	115.200	117.400
OCT	113.000	111.000	115.000	116.000	116.000	116.000
DEC	112.700	115.400	134.700	133.800	122.700	127.100
IONCAL (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	1.827	1.469	1.322	2.201	1.628	1.901
APR	.716	2.183	.211	.516	.298	.291
JUN	3.809	.797	.826	.233	.479	.890
AUG	.882	.415	.385	.570	1.089	.470
OCT	6.053	5.368	6.591	5.890	5.715	6.384
DEC	1.851	2.704	1.806	1.490	.484	1.687
LANGELIERS INDEX (DIMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = N/A		
FEB	.263	-.052	.219	.131	.271	.173
APR	.387	.109	.262	.259	.334	.300
JUN	.260	.012	.156	.175	.149	.182
AUG	.283	.202	.209	.190	.202	.198
OCT	.345	.107	.124	.153	.170	.159
DEC	.245	.078	.150	.125	.105	.073
MAGNESIUM (MG/L)			DET'N LIMIT = 0.1	GUIDELINE = 30 (F2)		
FEB	8.500	8.600	8.600	8.500	8.500	8.400
APR	8.500	8.600	8.400	8.400	8.300	8.300
JUN	8.400	8.100	8.000	8.100	7.900	8.000
AUG	8.350	8.300	8.200	8.050	8.250	8.200
OCT	7.900	7.900	7.700	7.900	8.000	7.800
DEC	7.900	8.000	8.550	8.400	7.900	8.150
SODIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 200 (A4)		
FEB	7.800	7.800	7.800	7.800	8.000	7.800
APR	10.400	10.200	10.200	10.400	10.200	10.200
JUN	8.200	7.600	8.000	7.600	8.200	7.600
AUG	6.300	6.300	6.500	6.300	6.300	6.200
OCT	6.600	6.600	7.000	7.000	6.800	6.600
DEC	6.700	6.900	11.600	11.600	9.800	10.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
AMMONIUM TOTAL (MG/L)			DET'N LIMIT = 0.002	GUIDELINE = 0.05 (F2)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	.018	BDL	.014	.020	.020	.020
JUN	BDL	.004 <T	.004 <T	.004 <T	BDL	.002 <T
AUG	.026	.002 <T	.012	.006 <T	.004 <T	.002 <T
OCT	.022	.024	.022	.038	.030	.032
DEC	BDL	.002 <T	.008 <T	.004 <T	.010	.006 <T
NITRITE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = 1 (A1)		
FEB	.008	BDL	.003 <T	.002 <T	.002 <T	.002 <T
APR	.016	.001 <T	.003 <T	.003 <T	.003 <T	.003 <T
JUN	.007	.006	.009	.007	.007	.007
AUG	.007	BDL	.001 <T	BDL	BDL	BDL
OCT	.005	BDL	BDL	.001 <T	BDL	BDL
DEC	.010	.005	.006	.005	.006	.005
TOTAL NITRATES (MG/L)			DET'N LIMIT = 0.005	GUIDELINE = 10 (A1)		
FEB	.505	.535	.470	.465	.465	.470
APR	.695	.690	.695	.685	.695	.685
JUN	.665	.645	.640	.635	.640	.650
AUG	.310	.365	.400	.375	.375	.395
OCT	.190	.220	.250	.275	.250	.235
DEC	.405	.410	.690	.675	.525	.570
NITROGEN TOT KJELD (MG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.240	.200	.150	.170	.180	.190
APR	.330	.200	.220	.150	.180	.160
JUN	.340	.120	.260	.120	.130	.150
AUG	.310	.180	.120	.130	.120	.120
OCT	.210	.130	.120	.120	.140	.325
DEC	.300	.060 <T	.090 <T	.080 <T	.110	.080 <T
PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)		
FEB	8.200	7.940	8.190	8.100	8.240	8.140
APR	8.300	8.080	8.210	8.210	8.280	8.250
JUN	8.200	8.030	8.150	8.160	8.140	8.170
AUG	8.280	8.250	8.220	8.210	8.210	8.190
OCT	8.310	8.160	8.140	8.170	8.180	8.170
DEC	8.210	8.090	8.060	8.040	8.070	8.020
PHOSPHORUS FIL REACT (MG/L)			DET'N LIMIT = 0.0005	GUIDELINE = N/A		
FEB	.005	.000 <T	.	.	.	.
APR	.004	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	.002 <T	BDL	.	.	.	.
OCT	.003	.000 <T	.	.	.	.
DEC	.004	BDL	.	.	.	.

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DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHOSPHORUS TOTAL (MG/L)		DET'N LIMIT = 0.002	GUIDELINE = .40 (F2)			
FEB	.025	.002 <T	.	.	.	.
APR	.045	.004 <T	.	.	.	.
JUN	.052	BDL	.	.	.	.
AUG	.024	.004 <T	.	.	.	.
OCT	.011	BDL	.	.	.	.
DEC	.050	BDL	.	.	.	.
SULPHATE (MG/L)		DET'N LIMIT = .200	GUIDELINE = 500 (A3)			
FEB	20.790	29.730	28.880	29.060	28.960	28.880
APR	21.230	30.760	30.610	30.500	30.410	30.900
JUN	19.460	35.340	35.290	35.140	34.090	34.030
AUG	18.290	27.630	27.310	27.280	27.640	27.860
OCT	17.070	26.890	27.340	27.490	27.210	27.280
DEC	17.640	27.860	31.970	32.310	30.230	30.270
TURBIDITY (FTU)		DET'N LIMIT = 0.05	GUIDELINE = 1 (A1)			
FEB	10.800	1.330	.630	1.600	.590	1.000
APR	19.000	.440	.490	.570	.560	.580
JUN	95.000	.540	.490	.570	.330	.330
AUG	2.900	.240 <T	.850	.360	.570	.340
OCT	4.700	.250	.290	.520	.640	.370
DEC	42.000	.450	.480	.360	.680	.600

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
METALS						
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)		
FEB	110.000	46.000	21.000	21.000	23.000	21.000
APR	150.000	31.000	24.000	24.000	31.000	23.000
JUN	260.000	39.000	35.000	36.000	42.000	42.000
AUG	54.000	79.000	88.000	72.000	70.000	78.000
OCT	65.000	61.000	53.000	46.000	48.000	47.000
DEC	230.000	27.000	23.000	20.000	25.000	22.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)		
FEB	.670 <T	.200 <T	.220 <T	.300 <T	.290 <T	.410 <T
APR	.700 <T	.260 <T	.180 <T	.220 <T	.300 <T	.230 <T
JUN	.450 <T	BDL	.110 <T	BDL	BDL	BDL
AUG	1.000 <T	.490 <T	.370 <T	.430 <T	.270 <T	.500 <T
OCT	1.100	.460 <T	.380 <T	.290 <T	.270 <T	.270 <T
DEC	.470 <T	BDL	BDL	BDL	BDL	BDL
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)		
FEB	20.000	17.000	18.000	17.000	18.000	18.000
APR	18.000	16.000	17.000	16.000	16.000	16.000
JUN	21.000	18.000	19.000	19.000	18.000	18.000
AUG	18.000	19.000	19.000	19.000	19.000	19.000
OCT	16.000	16.000	17.000	17.000	17.000	17.000
DEC	18.000	14.000	17.000	16.000	15.000	15.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)		
FEB	21.000	20.000 <T	23.000	21.000	22.000	21.000
APR	29.000	20.000 <T	25.000	24.000	27.000	19.000 <T
JUN	32.000	31.000	46.000	48.000	47.000	51.000
AUG	32.000	36.000	36.000	36.000	31.000	29.000
OCT	16.000 <T	30.000	31.000	32.000	34.000	28.000
DEC	15.000 <T	15.000 <T	19.000 <T	18.000 <T	19.000 <T	16.000 <T
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	.080 <T	BDL	BDL	.060 <T	.080 <T	.120 <T
AUG	BDL	.070 <T	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.060 <T	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	.100 <T	BDL
JUN	BDL	BDL	.100 <T	BDL	BDL	BDL
AUG	BDL	BDL	BDL	BDL	BDL	BDL
OCT	BDL	BDL	.070 <T	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL	BDL	BDL

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A		
FEB	.270 <T	.050 <T	.030 <T	.120 <T	.040 <T	.030 <
APR	.220 <T	.090 <T	.210 <T	.180 <T	.330 <T	.230 <
JUN	.410 <T	BDL	BDL	.080 <T	.080 <T	BDL
AUG	.030 <T	BDL	BDL	BDL	.030 <T	BDL
OCT	.040 <T	BDL	.030 <T	BDL	.040 <T	BDL
DEC	.400 <T	.040 <T	.050 <T	.030 <T	.080 <T	.040 <
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	1.700 <T	BDL	.830 <T	.840 <T	BDL	BDL
JUN	1.700 <T	.930 <T	1.700 <T	1.900 <T	2.000 <T	2.100 <
AUG	2.900 <T	3.000 <T	3.100 <T	2.900 <T	2.000 <T	1.600 <
OCT	BDL	2.200 <T	2.400 <T	2.600 <T	2.500 <T	1.900 <
DEC	.640 <T	BDL	BDL	BDL	BDL	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)		
FEB	1.600 <T	1.300 <T	140.000	16.000	90.000	29.000
APR	1.600 <T	3.500 <T	150.000	14.000	190.000	24.000
JUN	2.100 <T	2.600 <T	120.000	25.000	14.000	14.000
AUG	1.500 <T	1.900 <T	170.000	23.000	20.000	7.300
OCT	1.200 <T	2.200 <T	140.000	20.000	55.000	13.000
DEC	2.100 <T	1.800 <T	100.000	11.000	62.000	5.900
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)		
FEB	200.000	6.600 <T	15.000 <T	18.000 <T	BDL	BDL
APR	210.000	BDL	BDL	BDL	BDL	BDL
JUN	420.000	BDL	12.000 <T	13.000 <T	BDL	BDL
AUG	62.000	BDL	76.000	15.000 <T	BDL	BDL
OCT	100.000	BDL	44.000 <T	BDL	BDL	14.000 <T
DEC	460.000	BDL	18.000 <T	15.000 <T	10.000 <T	6.700 <T
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)		
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	.120	BDL	.	.	.	.
MANGANESE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A3)		
FEB	8.400	1.100	1.600	1.500	.580	.440 <T
APR	9.100	1.300	2.000	1.600	1.400	.460 <T
JUN	21.000	2.200	2.100	2.000	.520	.590
AUG	4.200	.310 <T	3.700	1.200	.360 <T	.270 <T
OCT	4.900	.560	2.200	1.200	.500 <T	.250 <T
DEC	22.000	.910	1.400	1.200	.530	.380 <T

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
MOLYBDENUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.890	.890	.970	.960	1.000	1.000
APR	.530	.840	.630	.790	.830	.720
JUN	.220 <T	.790	.750	.890	.880	.780
AUG	.910	.820	.920	.950	.860	.930
OCT	.690	.690	.970	.860	.740	.840
DEC	.230 <T	.590	.810	.780	.730	.780
NICKEL (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (D3)		
FEB	1.100 <T	.340 <T	1.400 <T	.730 <T	.410 <T	BDL
APR	1.300 <T	.410 <T	6.000	1.600 <T	13.000	2.500
JUN	.320 <T	BDL	3.400	.430 <T	BDL	BDL
AUG	BDL	BDL	5.900	.640 <T	BDL	BDL
OCT	1.400 <T	.640 <T	6.300	1.600 <T	1.900 <T	.920 <T
DEC	.920 <T	BDL	5.000	.720 <T	1.900 <T	.550 <T
LEAD (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 10. (A1)		
FEB	.710	.070 <T	1.500	.290 <T	.720	.350 <T
APR	.910	.810	1.700	.270 <T	10.000	.470 <T
JUN	1.600	.130 <T	1.500	.550	.460 <T	.350 <T
AUG	.310 <T	.150 <T	11.000	.760	.850	.280 <T
OCT	.310 <T	.240 <T	4.900	.530	1.700	.310 <T
DEC	1.500	.120 <T	1.700	.300 <T	1.300	.250 <T
ANTIMONY (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 146 (D4)		
FEB	.560	.420 <T	.550	.510	.550	.540
APR	.260 <T	.490 <T	.370 <T	.460 <T	.410 <T	.450 <T
JUN	.270 <T	.400 <T	.580	.460 <T	.500 <T	.430 <T
AUG	.470 <T	.520	.490 <T	.500 <T	.520	.500 <T
OCT	.470 <T	.360 <T	.440 <T	.540	.490 <T	.400 <T
DEC	.320 <T	.470 <T	.530	.510	.590	.550
SELENIUM (UG/L)			DET'N LIMIT = 1.00	GUIDELINE = 10 (A1)		
FEB	BDL	BDL	BDL	BDL	BDL	BDL
APR	BDL	BDL	BDL	BDL	BDL	BDL
JUN	BDL	1.700 <T	2.000 <T	1.400 <T	2.100 <T	1.200 <T
AUG	BDL	1.600 <T	1.500 <T	2.000 <T	BDL	1.800 <T
OCT	1.500 <T	2.100 <T	2.700 <T	2.200 <T	2.000 <T	1.500 <T
DEC	BDL	BDL	BDL	BDL	BDL	BDL
STRONTIUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = N/A		
FEB	160.000	150.000	150.000	150.000	160.000	160.000
APR	130.000	130.000	130.000	130.000	130.000	130.000
JUN	120.000	120.000	120.000	120.000	120.000	120.000
AUG	130.000	130.000	140.000	130.000	130.000	130.000
OCT	130.000	120.000	130.000	130.000	130.000	130.000
DEC	110.000	110.000	140.000	130.000	120.000	120.000

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
TITANIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = N/A		
FEB	8.400	5.500	5.800	6.300	6.200	6.500
APR	5.700	4.100 <T	4.900 <T	5.000 <T	4.900 <T	4.600 <
JUN	8.600	6.500	6.700	6.700	6.200	6.800
AUG	5.500	3.200 <T	4.200 <T	4.100 <T	3.700 <T	3.600 <
OCT	5.000 <T	3.500 <T	4.400 <T	4.000 <T	4.400 <T	4.000 <
DEC	5.500	2.700 <T	2.900 <T	2.700 <T	3.000 <T	2.600 <
URANIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (A1)		
FEB	.340 <T	.120 <T	.110 <T	.070 <T	.130 <T	.140 <
APR	.400 <T	.110 <T	.070 <T	.120 <T	.110 <T	.100 <
JUN	.340 <T	BDL	.060 <T	BDL	.070 <T	.060 <
AUG	.300 <T	.060 <T	.090 <T	.060 <T	.070 <T	.070 <
OCT	.280 <T	BDL	BDL	BDL	.060 <T	BDL
DEC	.280 <T	.080 <T	.080 <T	.100 <T	.060 <T	.070 <
VANADIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = N/A		
FEB	.510	.720	.660	.670	.690	.730
APR	.600	.750	.670	.680	.780	.740
JUN	.870	.690	.520	.570	.640	.580
AUG	.480 <T	.560	1.200	.610	.690	.680
OCT	.570	.340 <T	.640	.450 <T	.410 <T	.400 <
DEC	.750	.100 <T	.160 <T	.120 <T	.190 <T	.090 <
ZINC (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 5000 (A3)		
FEB	3.900	1.800 <T	4.700	1.600 <T	7.000	3.800
APR	5.000	2.600	8.000	1.400 <T	74.000	4.100
JUN	6.200	1.700 <T	6.200	2.600	4.400	4.200
AUG	1.700 <T	2.100	7.400	2.000 <T	10.000	2.800
OCT	1.800 <T	3.400	7.600	1.900 <T	32.000	3.300
DEC	7.900	2.800	13.000	3.000	38.000	3.500

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PESTICIDES & PCB						
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)		
FEB	BDL	1.000 <T	.	BDL	.	BDL
APR	!QU	!QU	.	!QU	.	!QU
JUN	1.000 <T	BDL	.	BDL	.	BDL
AUG	BDL	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	BDL	.	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)		
FEB	BDL	BDL	.	.	.	.
APR	BDL	BDL	.	.	.	.
JUN	50.000 <T	130.000 <T	.	.	.	.
AUG	90.000 <T	BDL	.	.	.	.
OCT	BDL	BDL	.	.	.	.
DEC	BDL	BDL	.	.	.	.

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	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
PHENOLICS (UG/L PHENOLICS)			DET'N LIMIT = .2	GUIDELINE = 2 (A4)		
FEB	BDL	BDL	.	.	.	.
APR	.600 <T	.600 <T	.	.	.	.
JUN	BDL	BDL	.	.	.	.
AUG	BDL	BDL	.	.	.	.
OCT	BDL	1.600	.	.	.	.
DEC	BDL	BDL	.	.	.	.

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DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM			
	RAW	TREATED	SITE 1		SITE 2	
			STANDING	FREE FLOW	STANDING	FREE FLOW
VOLATILES						
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	.050 <T	.	.050 <T	.	.050 <T
JUN	BDL	.100 <T	.	BDL	.	BDL
AUG	IEF	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	IU	.	IU	.	IU
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	.050 <T	.	BDL
AUG	IEF	BDL	.	BDL	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	IU	.	IU	.	IU
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	.050 <T	.	.050 <T
JUN	BDL	.150 <T	.	BDL	.	.050 <T
AUG	IEF	.100 <T	.	.050 <T	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	IU	.	IU	.	IU
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	BDL	.	BDL	.	BDL
JUN	BDL	BDL	.	.050 <T	.	BDL
AUG	IEF	BDL	.	.050 <T	.	BDL
OCT	BDL	BDL	.	BDL	.	BDL
DEC	BDL	IU	.	IU	.	IU
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)		
FEB	.500 <T	10.000	.	10.100	.	11.400
APR	BDL	5.900	.	6.500	.	7.200
JUN	BDL	11.800	.	8.500	.	13.700
AUG	IEF	12.600	.	13.300	.	15.800
OCT	BDL	11.000	.	11.000	.	13.100
DEC	BDL	IU	.	IU	.	IU
111, TRICHLOROETHANE (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 200 (D1)		
FEB	BDL	BDL	.	BDL	.	BDL
APR	BDL	.060 <T	.	BDL	.	BDL
JUN	.100 <T	BDL	.	BDL	.	BDL
AUG	IEF	BDL	.	BDL	.	BDL
OCT	.040 <T	BDL	.	BDL	.	BDL
DEC	BDL	IU	.	IU	.	IU

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM UNION WSS 1990

		WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
		RAW	TREATED	SITE 1		SITE 2
				STANDING	FREE FLOW	STANDING	FREE FLOW
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 350 (A1+)		
FEB	BDL	8.950		9.000		10.100
APR	BDL	5.950		6.450		6.400
JUN	BDL	8.300		6.500		8.550
AUG	IEF	8.350		8.750		9.550
OCT	BDL	7.500		7.300		8.200
DEC	BDL	IU		IU		IU
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 350 (A1+)		
FEB	BDL	4.900		5.200		5.500
APR	BDL	3.400		3.100		3.000
JUN	BDL	4.900		4.300		4.900
AUG	IEF	4.600		5.100		5.100
OCT	BDL	4.500		4.300		4.700
DEC	BDL	IU		IU		IU
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05		GUIDELINE = 5 (D1)		
FEB	BDL	BDL		BDL		BDL
APR	BDL	BDL		BDL		BDL
JUN	BDL	BDL		BDL		BDL
AUG	IEF	.100 <T		.050 <T		.100 <T
OCT	BDL	BDL		BDL		BDL
DEC	BDL	IU		IU		IU
BROMOFORM (UG/L)			DET'N LIMIT = 0.20		GUIDELINE = 350 (A1+)		
FEB	BDL	.800 <T		.800 <T		.800 <T
APR	BDL	.200 <T		.200 <T		.200 <T
JUN	BDL	.600 <T		.800 <T		.600 <T
AUG	IEF	.800 <T		1.000 <T		1.000 <T
OCT	BDL	.600 <T		.600 <T		.600 <T
DEC	BDL	IU		IU		IU
1,4 DICHLOROBENZENE (UG/L)			DET'N LIMIT = 0.10		GUIDELINE = 5 (A1)		
FEB	BDL	BDL		BDL		BDL
APR	BDL	BDL		BDL		BDL
JUN	BDL	BDL		.500 <T		BDL
AUG	IEF	BDL		BDL		BDL
OCT	BDL	BDL		BDL		BDL
DEC	BDL	IU		IU		IU
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50		GUIDELINE = 350 (A1)		
FEB	BDL	24.550		25.100		27.800
APR	BDL	15.450		16.250		16.800
JUN	BDL	25.600		20.100		27.750
AUG	IEF	26.400		28.050		31.350
OCT	BDL	23.650		23.300		26.650
DEC	BDL	IU		IU		IU

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A
ENDRIN	NG/L	5.0	1600 (D3)
GAMMA CHLORDANE	NG/L	2.0	7000 (A1)
HEPTACHLOR	NG/L	1.0	3000 (A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000 (A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000 (A1)
METHOXYCHLOR	NG/L	5.0	900000 (A1)
METOLACHLOR	NG/L	500.0	50000 (A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000 (A1)
MIREX	NG/L	5.0	N/A
P,P-DDD	NG/L	5.0	N/A
O,P-DDT	NG/L	5.0	30000 (A1)
OXYCHLORDANE	NG/L	2.0	N/A
PCB	NG/L	20.0	3000 (A2)
PPDDE	NG/L	1.0	30000 (A1)
PPDDT	NG/L	5.0	30000 (A1)
PROMETONE	NG/L	50.0	52500 (D3)
PROMETRYNE	NG/L	50.0	1000 (A2)
PROPAZINE	NG/L	50.0	700000 (D3)
SIMAZINE	NG/L	50.0	10000 (A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000 (A2)
TOXAPHENE	NG/L	500.0	5000 (A1)
PHENOLICS			
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2 (A4)
SPECIFIC PESTICIDES			
2,4 D PROPIONIC ACID	NG/L	100.	N/A
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000 (A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000 (A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000 (B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000 (D3)
CARBARYL (SEVIN)	NG/L	200.	90000 (A1)
CARBOFURAN	NG/L	2000.	90000 (A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A
CICP (CHLORPROPHAM)	NG/L	2000.	350000 (G)
DIALLATE	NG/L	2000.	N/A
DIAZINON	NG/L	20.	20000 (A1)
DICAMBA	NG/L	50.	120000 (A1)
DICHLOROVOS	NG/L	20.	N/A
EPTAM	NG/L	2000.	N/A
ETHION	NG/L	20.	35000 (G)
IPC	NG/L	2000.	N/A
MALATHION	NG/L	20.	190000 (A1)
METHYL PARATHION	NG/L	50.	7000 (B3)
METHYLTRITHION	NG/L	20.	N/A
MEVINPHOS	NG/L	20.	N/A
PARATHION	NG/L	20.	50000 (A1)
PHORATE (THIMET)	NG/L	20.	2000 (A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000 (D3)
RELDAN	NG/L	20.	N/A
RONNEL	NG/L	20.	N/A
SILVEX (2,4,5-TP)	NG/L	20.	10000 (A1)
VOLATILES			
1,1 DICHLOROETHANE	UG/L	0.10	N/A
1,1 DICHLOROETHYLENE	UG/L	0.10	7 (D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200 (A1)
1,2 DICHLOROETHANE	UG/L	0.05	5 (A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL

This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do <u>not</u> rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.